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EXAMINER	
AMRANY, ADI	

ART UNIT	PAPER NUMBER
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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/802,913	SUZUKI ET AL.	
	Examiner	Art Unit	
	Adi Amrany	2836	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *18 March 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-14 and 18-20* is/are rejected.

7)☒ Claim(s) *15-17* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *18 March 2004* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date 3/18/04, 8/3/05, 8/10/05, 9/12/05, 12/19/05
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Drawings

1. The drawings are objected to because they contain the following informalities:

a. Figure 1; the control circuit 27, on the right side of the drawing, between the labels 31B and 31C, is incorrectly labeled "28";

b. Figure 4; the lead lines for reference numbers 109 and 110 (located on the top of the drawing) do not point to their corresponding parts. Each lead line needs to be extended to reach the next lower component;

c. Figure 6; the second occurrence of item 163, referring to the hard disk drive on the bottom of the figure is incorrectly labeled. It should read "165" to be consistent with the specification;

d. Figure 7; the lead line for reference numbers 109, 164, or 167 (located on the top right-hand corner of the drawing) needs to be extended to reach the DC/DC converter;

e. Figure 7; item 172A (at the bottom left-hand corner) is incorrectly labeled. It should read "171A";

f. Figure 8; item 125A is incorrectly labeled. It should read "171A."

Corrected drawing sheets in compliance with 37 CFR 1.121(d), or amendment to the specification to add the reference character(s) in the description in compliance with 37 CFR 1.121(b) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being

amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

2. The disclosure is objected to because of the following informalities:

a. Page 18, line 1; the phrase "supplied with DC power at the same voltage level from" is unclear. It appears that the word "from" was inserted instead of "as." Further, the sentence contains no reference voltage level to go with the comparison "same."

b. Page 18, line 2; the letter "n" is missing in the article 'a' in the phrase "from a*n* AC/DC power supply"

c. Page 18, lines 2-4; the phrase "which is configured for twofold redundancy or higher redundancy, to enable mutual substitution" is not unclear. The redundancy characteristic of AC/DC power supply circuits 29 was already disclosed and established on page 17, lines 5-8. This phrase further defines the AC/DC power supply, which is not the main subject of the sentence (power supply line 103A). If the phrase is to remain, please consider rewriting it as a new sentence.

d. Page 20, line 9; the power supply lines are incorrectly labeled. Please change 113A and 113B to 103A and 103B, respectively.

e. Page 20, lines 16; 19-20, connectors are incorrectly labeled. Please change 119A and 119B to 121A and 121B, respectively.

f. Page 21, line 19; it appears that the "second power supply line" should refer to item 103B, not 103A.

g. Page 21, line 18; "110" should be moved to appear directly after "input selector" since the 110 designation refers to the input selector, and not 'from the top.'

h. Page 22, line 25 to page 23, line 2; the sentence is unclear and difficult to read. The sentence may be easier to read if the subject were placed at the beginning. Please consider moving the subject, HDD unit 107 and 108, to the beginning of the sentence.

Furthermore, the sentence discloses that if a HDD 107, 108 can accept a plurality of voltage levels, the HDD can be installed on the same motherboard 28. The HDD units, however, are installed in an HDD pack 33, and are not directly connected to the motherboards 28. See figure 3, page 20, and disclosure of prior art on page 19, lines 22-23.

i. Page 23, line 7 to page 24, line 2; it is unclear how applicant derived the disclosure of power supply current reduction. Assuming that the conversion efficiency of the power conversion circuit contained within the single-power-supply type HDD is 80%, how does that result in the comparative power supply

current being reduced by half? Also, how does using the configurations of figures 2 and 3, as compared with applicant's conventional configuration (prior art), reduce the power supply current? Lastly, how are the impedances and power supply noise reduced by using this configuration?

j. Page 23, line 27; the second instance of "109" should be removed, since the 109 designation refers to a DC/DC converter contained within HDD pack 33, but external to HDD unit 107.

k. Page 24, line 1; "107" should be replaced with "108," since the 108 HDD units (not 107) are disclosed to contain internal converters.

l. Page 24, lines 6-8; the phrase is incorrect in stating that the HDD units 107, 131, and 133 are installed on the same motherboard. Please revise to indicate that the HDD units are installed in HDD packs 33, which are connected/installed on the motherboards 28. Installing HDDs on motherboard 28 has previously been disclosed as prior art (page 19, lines 22-23).

m. Page 24, lines 11-13; the phrase "another voltage level from those above" is unclear. Please consider making the following revision: "HDD unit 131 is a single-power-supply type, operating on DC power (power supply line 139) at *a voltage level different from* those above (24v).

n. Page 24, lines 24-25; the phrase is a confusing and indefinite. Please consider removing "are installed" from line 24, and placing "are installed" on line 25, after "141."

o. Page 25, lines 2-4; the use of the base word "different" makes the sentence awkward and unclear. Please consider making the following revision: "The differences in these types of DC/DC converters 109, 135, and 141 are mainly in the output voltages of the step-down converters 111, 137, and 143 installed therein."

p. Page 27, line 20; the corresponding connector on the motherboard is incorrectly labeled. Please replace 121B with 119B. Connector 121B is located on DC/DC converter as shown in figure 3. Please also replace 121B with 119B on page 28, line 2.

q. Page 29, line 5; the u-turn power supply line is incorrectly labeled. Please change 151 to 153, as supply line 153 is shown as the sole active transmission line which power the 3rd HDD unit 163, in figure 6.

r. Page 32, line 7; the reference numbers "27A and 27B" should be moved to line 5, after "control circuits," which are the correct component for these reference numbers.

s. Page 32, line 8; the channel adapters are incorrectly labeled. Please change 22 to 21.

t. Page 35, line 8; it appears the applicant intended to state, "extend the lifetime," instead using the word "extent."

Appropriate correction is required.

Claim Objections

3. Dependent claims 12-17 are objected to because they recite the limitation "said motherboard." There is insufficient antecedent basis for this limitation in independent claim 11.

4. Claims 13 and 18-19 are objected to because the limitations "said power conversion circuit *in/within* said second type of storage device pack" have no basis in independent claim 11. There is no recitation in claim 11 that the power conversion circuit is located *in* or *within* any of the storage device packs.

Claim Rejections - 35 USC § 112

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claims 9-10 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 9 is rejected because the limitation that any of the storage devices is a Fiber Channel (FC) or Serial Advanced Technology Attachment (SATA) storage device is indefinite. Component specifications are improper claim limitations. The design, construction, material composition, performance, etc. of these interface specification can be updated or altered at any time. The inclusion of specifications as a limitation of the claimed invention causes the claim to be indefinite.

Claim 10 is rejected to because it is dependent on, and includes the rejected limitation of, claim 9 and because it recites limitations regarding the FC/SATA converter.

Claim Rejections - 35 USC § 102

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-3, 6-7 and 11 are rejected under 35 U.S.C. 102(e) as being anticipated by Suzuki (US 7,051,216).

With respect to claim 1, Suzuki discloses a storage system, which can be connected to a host computer (figure 1, item 1000; column 5, lines 33-46), having:

a plurality of storage devices (figure 1, items 210; column 5, lines 50-53) which store data from said host;

a plurality of housings (figure 1, items 200; column 5, lines 50-53) in which said plurality of storage devices are mounted; and

a plurality of first power supplies (figure 1, items 300a, 300b; column 5, lines 53-64) which supply a voltage to said plurality of storage devices; and wherein

at least one of said plurality of housings has a first voltage converter (figure 1, items 220; column 6, lines 45-49) which receives power having a first voltage value from said first power supply, converts said first voltage value into a

second voltage value different from said first voltage value, and supplies power having a single voltage value to said storage device.

With respect to claim 2, Suzuki discloses the storage system according to claim 1, and further discloses wherein said first voltage converter supplies power having said single voltage value to said storage device via a single power supply line (figure 1, single power supply line connects items 220a to 210; column 7, lines 4-10).

With respect to claim 3, Suzuki discloses the storage system according to claim 1, and further discloses, wherein said plurality of first power supplies are AC/DC power supplies (column 5, lines 53-57), said first voltage converter is a DC/DC converter (column 6, lines 45-46), and said first voltage value is higher than said single voltage value (column 6, line 45, "step down converter").

With respect to claim 6, Suzuki discloses the storage system according to claim 1, and further discloses, wherein said first voltage converter receives power having a plurality of different voltage values (figure 1, items A, B in 220; column 6, line 65 to column 7, line 4), and outputs power having said single voltage value (figure 1, single power supply line connects items 220a to 210; column 7, lines 4-10).

With respect to claim 7, Suzuki discloses the storage system according to claim 1, and further discloses:

wherein any of said plurality of housings is a first housing (figure 1, item 200) having a first voltage converter (figure 1, item 220) which receives power having the first voltage value from said first power supply (figure 1, item 300a), converts said first voltage value into a second voltage value different from said

first voltage value, and supplies power having a single voltage to said storage device (column 6, lines 45-49, 5v output),

and any of the other of said plurality of housings is a second housing (figure 1, item 200) having a second voltage converter (figure 1, item 220) which receives power having the first voltage value from said first power supply (figure 1, item 300a), converts said first voltage value into a second voltage value different from said first voltage value, and supplies power having a plurality of different voltage values to said storage device (column 6, lines 45-49, 12v output).

Suzuki discloses a plurality of sets of parallel AC/DC converters. The first set of parallel AC/DC converters (300a) output the first voltage value to each of the first voltage converter (#1 of n converters) and the second voltage converter (#2 of n converters). The first and second voltage converters each convert the first voltage value to a second voltage value (5v and 12v, respectively), and supplies the output power to their respective housings.

With respect to claim 11, Suzuki discloses a storage system (figure 1, item 1000; column 5, lines 33-46), comprising:

a power supply circuit (figure 1, item 300a; column 5, lines 53-64) which outputs a single type of power having a single voltage level;

a main body (figure 1, item 100; column 5, lines 47-50) having a main power supply line (figure 1, "DC power supply line A") to transmit said single type of power output from said power supply circuit, a data transfer path (inherent) for

data transfer, and a plurality of pack connection sites (connections to motherboard; column 5, lines 47-50);

a plurality of storage device packs (figure 1, items 200; column 5, lines 50-53) which can receive said single type of power from said main power supply line (connection of "DC power supply line A" to 200), which are each connected to said plurality of pack connection sites on said main body so as to enable exchange of data with said data transfer path, and which can be removed from said pack connection sites, and wherein;

each storage device pack has a physical storage device (figure 1, items 210; column 5, lines 50-53) requiring the supply of one or more types of power each having a prescribed voltage level; and

a power conversion circuit (figure 1, items 220; column 6, lines 45-49) which receives said single type of power from said main power supply line, converts said single type of power into said one or more types of power required by said physical storage device units, and outputs said converted one or more types of power to said physical storage devices, and

the voltage level of said single type of power form said main power supply line is equal to or higher than the highest voltage level of said one ore more types of power required by said physical storage device (column 6, line 45, "step-down converter").

Suzuki discloses that the hard disk drives are connected to a motherboard. It in inherent that this connection comprises both power and data pack connection sites.

Further, it is inherent that hard disk drives (storage device packs) may be removed from mechanical, electrical, and data connections with the main supporting body, as it is common in the art that hard disk drives are not permanent fixtures in computer systems. Lastly, since the converter of the first DC power supply is a step-down converter, it is inherent that the single voltage value of the main power supply line would be higher than or equal to the voltage level required by the physical storage devices (disk drives), which are located at the output of the down-converter.

8. Claims 1-6, 8-11 and 20 are rejected under 35 U.S.C. 102(e) as being anticipated by Oomori (US 2004/0003306).

With respect to claim 1, Oomori discloses a storage system (figure 1, item 11; paragraph 18), which can be connected to a host computer, having:

a plurality of storage devices (figure 1, item 114; paragraph 19) which store data from said host;

a plurality of housings in which said plurality of storage devices are mounted (figure 1, item 114);

a plurality of first power supplies (figure 1, item 21; paragraph 22) which supply a voltage to said plurality of storage devices, and wherein;

at least one of said plurality of housings has a first voltage converter (figure 1, item 117; paragraph 26) which receives power having a first voltage value from said first power supply, converts said first voltage values into a second voltage value different from said first voltage value, and supplies power having a single voltage value to said storage system.

The plurality of storage devices (114) each contains its own housing (114). Storage devices (hard disk drives) comprise sensitive components that must be protected from external interference.

With respect to claim 2, Oomori discloses the storage system according to claim 1, and further discloses said first voltage converter supplies power having said single voltage value to said storage device via a single power supply line (figure 1, single transmission line connecting power supply 21 and power converter 117; paragraph 26, lines 4-5).

With respect to claim 3, Oomori discloses the storage system according to claim 1, and further discloses said plurality of first power supplies are AC/DC power supplies (figure 1, items 211-213; paragraph 22), said first voltage converter is a DC/DC converter (figure 1, item 117; paragraph 21), and said first voltage value is higher than said single voltage value (paragraph 26). Oomori disclose a first voltage value of 24v and lower single voltage values of +5v, +/- 12v, or 3.3v.

With respect to claim 4, Oomori discloses the storage system according to claim 1, and further discloses said plurality of storage devices incorporate internal voltage conversion circuits (figure 2, item 501; paragraph 39) which convert power supplied by said first voltage converter having a single voltage value in a plurality of voltage values.

With respect to claim 5, Oomori discloses the storage system according to claim 4, and further discloses power having one of the plurality of voltage values converted by said internal voltage conversion circuits is used to drive magnetic storage media of said

storage devices, and power having another of said plurality of voltage values is used to drive interface logic circuit of said storage devices (paragraph 26, lines 5-14).

With respect to claim 6, Oomori discloses the storage system according to claim 1, and further discloses said first voltage converter receives power having a plurality of different voltage values and outputs power having said single voltage value (figure 3, items 31-33 and 117; paragraph 41)

With respect to claim 8, Oomori discloses the storage system according to claim 1, and further discloses a motherboard is positioned between said first power supplies and said housings, and said first voltage converter is connected, via said motherboard, to a power supply line connecting said storage device. Oomori discloses that the CPUs (111) are mounted on a motherboard (paragraph 20, lines 1-3). The motherboard is shown in figure 1 as the bus connecting the CPUs (111) to the system controller (112). The motherboard is expanded to also connect the system controller to each of the other components of the server computer (11), as shown by the bus lines in figure 1. It is inherent that the Oomori first voltage converter (117) contains an electrical connection to the motherboard in order to distribute power to the storage device housings.

With respect to claims 9 and 10, Oomori discloses the storage system according to claim 1, and further the claims do not further limit independent claim 1. The limitations recited in claims 9-10 are rejected as being indefinite, and therefor, are not interpreted as part of the claimed invention.

With respect to claim 11, Oomori discloses a storage system (figure 1, item 11; paragraph 18), comprising:

a power supply circuit (figures 1, 4, item 21; paragraph 22) which outputs a single type of power having a single voltage value (figure 4, item 42; paragraph 26, lines 1-5);

a main body (figures 1, 4, item 11; paragraph 18) having a main power supply line to transmit said single type of power output from said power supply circuit (inherent), a data transfer path for data transfer (figure 1, "motherboard", paragraph 20), and a plurality of pack connection sites (figure 1, connection between motherboard and item 114);

a plurality of storage device packs (figure 1, items 114; paragraph 19) which can receive said single type of power from said main power supply line (paragraph 26, lines 5-8), which are each connected to said plurality of pack connection sites (figure 1, connection motherboard and items 114) on said main body so as to enable exchange of data with said data transfer path, and which can be removed from said pack connection sites;

each storage device pack has a physical storage device (figure 1, items 114) requiring the supply of one or more types of power each having a prescribed voltage level;

a power conversion circuit (figure 1, item 117; paragraph 21) which receives said single type of power from said main power supply line, converts said single type of power into said one or more types of power required by said physical storage device units, and outputs said converted one or more types of power to said physical storage device;

the voltage level of said single type of power form said main power supply line is equal to or higher than the highest voltage level of said one or more types of power required by said physical storage device (page 2, paragraph 26).

Oomori discloses a power supply (21) output value of 24v and lower DC/DC converter voltage output values of +5v, +/- 12v, and 3.3v. Since the converter is a down-converter, it is inherent that the single voltage value of the main power supply line would be higher than or equal to the voltage level required by the physical storage devices, which are located at the output of the down-converter.

With respect to claim 20, Oomori discloses the storage system according to claim 11, and further discloses said physical storage device is a hard disk drive (figure 1, item 114; paragraph 19).

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

11. Claims 7, 12-14 and 18-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Oomori.

With respect to claim 7, Oomori discloses the storage system according to claim 1, and further discloses:

wherein any of said plurality of housings is a first housing (figure 5, item 114, solid hard drive) having a first voltage converter (figures 5, 6, item 117A) which receives power having the first voltage value from said first power supply (figures 5, 6, item 21), converters said first voltage value into a second voltage value different from said first voltage value, and supplies power having a single voltage value to said storage device; and

any of the other of said plurality of housings is a second housing (figure 5, item 114, dashed hard drive) having a second voltage converter (figures 5, 6, item 117B) which receives power having the first voltage value from said first power supply (figures 5, 6, item 21), converters said first voltage value into a second voltage value different from said first voltage value, and supplies power having a plurality of different voltage values to said storage device (paragraphs 53 and 54).

It would be obvious to configure the first voltage converter to output only one voltage level. The first voltage converter (117A) receives a first voltage value from the first power supply, and then outputs a plurality of second voltage levels to the components of the system (11). One skilled in the art would configure the first voltage converter to output a single voltage level when the storage device is of a type that only requires one voltage level.

It would also be obvious to diverge the outputs of the converters so that each converter supplies only a portion of the hard disk drives (114). The first and second voltage converters (117A, 117B) are redundant converters located within the computer

(11) that supply a plurality of voltage levels to the internal components of the computer. One skilled in the art would decouple the system of a plurality of converters and a plurality of loads, so that each converter only supplies voltage to a select grouping of loads (hard drive disks).

With respect to claim 12, Oomori discloses the storage system according to claim 11, and further discloses:

said first type of storage device pack (figure 1, item 114) has a multiple-power-supply type physical storage device which requires the supply of a plurality of types of power each having a prescribed voltage level; and

a power conversion circuit (figure 1, item 117; paragraph 26) which converts said single type of power from said main power line into the plurality of types of power required by said multiple-power-supply type physical storage device, and inputs said plurality of types of power to said multiple-power-supply type physical storage device; and

said second type of storage device pack (figure 1, item 114) has a single-power-supply type physical storage device which requires the supply of one type of power having a prescribed voltage level; and

a power conversion circuit (figure 1, item 117; paragraph 26) which converts said single type of power from said main power line into the plurality of types of power required by said multiple-power-supply type physical storage device, and inputs said plurality of types of power to said multiple-power-supply type physical storage device; and

each type of storage device pack can be connected to any of said plurality of pack connection sites on said motherboard (figure 1, connection between hard disks (114) to motherboard).

It would be obvious that the Oomori storage system may comprise first and second types of storage device packs. The power conversion circuit (117) outputs a plurality of voltage levels for operating different devices. One skilled in the art would configure the power conversion circuit to supply multiple voltage levels to a multiple-power-supply type of physical storage device and supply a single voltage level to a single-power-supply type of physical storage device.

With respect to claim 13, Oomori discloses the storage system according to claim 12. Although not expressly disclosed in Oomori, it would be obvious that said single-power-supply type physical storage device with said second type of storage device pack has a plurality of power supply input terminals; and said power conversion circuit *within* said second type of storage device pack inputs said one type of power to said single-power-supply type physical storage device via said plurality of power supply input terminals.

Oomori discloses that the power supply circuit (21) comprises redundant power supply units (figure 5, items 211-213). Each power supply unit outputs a voltage level (figure 3, items 31-33; paragraph 41) over separate power lines to the power conversion circuits (figure 5, items 117A, 117B). Oomori further discloses that the power conversion circuit (117) may comprise a redundant circuit (figure 5, items 117A and 117B). One skilled in the art would apply the power line and diode configuration shown

in figure 3 to the power connection between the plurality of DC/DC converters (117A/B) and a single-power-supply type physical storage device.

With respect to claim 14, Oomori discloses the storage system according to claim 11, and further discloses:

said first type of storage device pack (figure 1, item 114) has a first type of physical storage device requiring the supply of a first type of power having a first voltage level; and

a power conversion circuit (figure 1, item 117; paragraph 26) which converts said single type of power from said main power line into said first type of power required by said first type of physical storage device, and inputs said first type of power to said first type of physical storage device; and

said second type of storage device pack (figure 1, item 114) has a second type of physical storage device requiring the supply of a second type of power having a second voltage level different from said first voltage level; and

a power conversion circuit (figure 1, item 117; paragraph 26) which converts said single type of power from said main power line into said second type of power required by said second type of physical storage device, and inputs said second type of power to said second type of physical storage device; and

each type of storage device pack can be connected to any of said plurality of pack connection sites on said motherboard (figure 1, connection between hard disks (114) to motherboard).

It would be obvious that the Oomori storage system may comprise first and second types of storage device packs, as discussed above. The power conversion circuit (117) outputs a plurality of voltage levels for operating different devices. One skilled in the art would configure the power conversion circuit to supply a first and second voltage levels to physical storage devices that required a first type of voltage and a second type of voltage, respectively.

With respect to claim 18, Oomori discloses the storage system according to claim 11, and further, it would be obvious to one skilled in the art that the Oomori system comprises a power supply control circuit which individually controls the turning-on and turning-off of said power conversion circuits *in* said plurality of storage device packs.

Oomori discloses a control circuit (figure 1, item 112; paragraph 19), and further discloses that each power conversion circuit comprises regulators (paragraph 39). One skilled in the art would recognize that the control circuit controls the regulators of each conversion circuit.

With respect to claim 19, Oomori discloses the storage system according to claim 11, and further, it would be obvious to one skilled in the art that the Oomori system comprises a power supply control circuit which individually controls the output voltage levels of said power conversion circuits *within* said plurality of storage device packs, according to the power supply voltage levels required by each of said physical storage devices within said plurality of storage device packs.

As discussed above, Oomori discloses a control circuit (figure 1, item 112; paragraph 19) and regulators within each power conversion circuit (paragraph 39). One

skilled in the art would recognize that the control circuit controls the output voltage levels of the power conversion circuits.

Allowable Subject Matter

12. Claims 15-17 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Oomori discloses a power conversion circuit to convert the single type of power from the main power supply line into a single or plurality of voltage levels that are required by the storage device packs and an input power supply line to input types of power to the storage device pack.

With respect to claim 15, the prior art does not teach or suggest the plurality of pack connection sites on the motherboard have a U-turn power supply line to receive, and once again input one or more types of power to said storage device pack, and at least one power-returning type of storage device pack comprising a return power supply line to supply power from said conversion circuit to said U-turn power supply line.

With respect to claim 16, the prior art does not teach or suggest the limitations of claim 15, as discussed above.

With respect to claim 17, the prior art does not teach or suggest a plurality of different types of storage device packs comprising a first and second type of data transfer interface and a data transfer interface conversion circuit which converts the first data transfer interface of said data transfer path of aid motherboard into said second

data transfer interface of said second type of physical storage device and provides said second data transfer interface to said second type of physical storage device.

As discussed above, Oomori discloses the power conversion circuit to convert the single type of power from said main power supply line into the power required by the first and second types of physical storage devices, the data transfer interface conversion circuit, and any of the electrical components contained within the computer (11).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Adi Amrany whose telephone number is (571) 272-0415. The examiner can normally be reached on weekdays, from 9am-5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Brian Sircus can be reached on (571) 272-2800 x36. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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AA

BURTON S. MULLINS
PRIMARY EXAMINER